

CLAIMS

1. A method for the late introduction of additives into polyethylene terephthalate, comprising:

polymerizing polyethylene terephthalate precursors via melt phase polycondensation to form polyethylene terephthalate polymers; and

introducing one or more additives into the polyethylene terephthalate polymers via a reactive carrier that has a molecular weight of between about 300 and 10,000 g/mol;

wherein the one or more additives are introduced to the polyethylene terephthalate polymers in quantities such that their total concentration in the polyethylene terephthalate polymers is less than about one weight percent.

2. A method according to Claim 1, further comprising solid state polymerizing the polyethylene terephthalate polymers.

3. A method according to Claim 1, further comprising forming the polyethylene terephthalate polymers into containers, fibers, or films.

4. A method according to Claim 1, wherein the reactive carrier and the one or more additives are introduced to the polyethylene terephthalate polymers without employing an extruder.

5. A method according to Claim 1, wherein the reactive carrier has a molecular weight of between about 6,000 and 10,000 g/mol.

6. A method according to Claim 1, wherein the reactive carrier has a molecular weight of between about 4,000 and 6,000 g/mol.

7. A method according to Claim 1, wherein the reactive carrier has a molecular weight of between about 2,000 and 4,000 g/mol.

8. A method according to Claim 1, wherein the reactive carrier has a molecular weight of between about 1,000 and 2,000 g/mol.

9. A method according to Claim 1, wherein the reactive carrier has a molecular weight of between about 400 and 1,000 g/mol.

10. A method according to Claim 1, wherein the reactive carrier is a liquid or slurry at near ambient temperatures.

11. A method according to Claim 1, wherein the reactive carrier is introduced to the polyethylene terephthalate polymers in quantities such that its concentration in the polyethylene terephthalate polymers is less than about one weight percent

12. A method according to Claim 1, wherein the reactive carrier is introduced to the polyethylene terephthalate polymers in quantities such that its concentration in the polyethylene terephthalate polymers is less than about 1,000 ppm.

13. A method according to Claim 1, wherein the reactive carrier possesses carboxyl, hydroxyl, or amine functional groups.

14. A method according to Claim 1, wherein the one or more additives are selected from the group consisting of UV absorbers, heat-up rate enhancers, stabilizers, inert particulate additives, colorants, antioxidants, branching agents, barrier agents, oxygen scavengers, crystallization control agents, acetaldehyde reducing agents, impact modifiers, catalyst deactivators, melt strength enhancers, anti-

static agents, lubricants, chain extenders, nucleating agents, solvents, fillers, and plasticizers.

15. A method for the late introduction of additives into polyethylene terephthalate, comprising:

polymerizing polyethylene terephthalate precursors via melt phase polycondensation to form polyethylene terephthalate polymers; and

introducing into the polyethylene terephthalate polymers a reactive carrier having a molecular weight of between about 300 and 10,000 g/mol, the reactive carrier being the delivery vehicle for one or more additives;

wherein the reactive carrier is introduced to the polyethylene terephthalate polymers in quantities such that the concentration of the reactive carrier in the polyethylene terephthalate polymers is less than about one weight percent; and

wherein the reactive carrier is introduced to the polyethylene terephthalate polymers via an additive delivery system that does not employ an extruder to introduce the reactive carrier into the polyethylene terephthalate polymers.

16. A method according to Claim 15, further comprising solid state polymerizing the polyethylene terephthalate polymers.

17. A method according to Claim 15, further comprising forming the polyethylene terephthalate polymers into containers, fibers, or films.

18. A method according to Claim 15, wherein the reactive carrier has a molecular weight of between about 6,000 and 10,000 g/mol.

19. A method according to Claim 15, wherein the reactive carrier has a molecular weight of between about 4,000 and 6,000 g/mol.

20. A method according to Claim 15, wherein the reactive carrier has a molecular weight of between about 2,000 and 4,000 g/mol.

21. A method according to Claim 15, wherein the reactive carrier has a molecular weight of between about 1,000 and 2,000 g/mol.

22. A method according to Claim 15, wherein the reactive carrier has a molecular weight of between about 400 and 1,000 g/mol.

23. A method according to Claim 15, wherein the reactive carrier is a liquid or slurry at near ambient temperatures.

24. A method according to Claim 15, wherein the reactive carrier is introduced to the polyethylene terephthalate polymers in quantities such that its concentration in the polyethylene terephthalate polymers is less than about 1,000 ppm.

25. A method for the late introduction of additives into polyethylene terephthalate, comprising:

polymerizing polyethylene terephthalate precursors via melt phase polycondensation to form polyethylene terephthalate polymers having a target intrinsic viscosity of at least about 0.45 dl/g;

then, after the polyethylene terephthalate polymers have achieved the target intrinsic viscosity, introducing into the polyethylene terephthalate polymers a reactive carrier having a molecular weight of between about 300 and 10,000 g/mol, the reactive carrier being the delivery vehicle for one or more additives; and

thereafter completing the melt phase polycondensation of the polyethylene terephthalate polymers;

wherein the reactive carrier is introduced to the polyethylene terephthalate polymers in quantities such that the concentration of the reactive carrier in the polyethylene terephthalate polymers is less than about one weight percent; and

wherein the reactive carrier is introduced to the polyethylene terephthalate polymers via an additive delivery system that does not employ an extruder to introduce the reactive carrier into the polyethylene terephthalate polymers.

26. A method according to Claim 25, wherein the target intrinsic viscosity of the polyethylene terephthalate polymers is at least about 0.50 dl/g.

27. A method according to Claim 25, wherein the target intrinsic viscosity of the polyethylene terephthalate polymers is at least about 0.55 dl/g.

28. A method according to Claim 25, wherein the target intrinsic viscosity of the polyethylene terephthalate polymers is at least about 0.60 dl/g.

29. A method according to Claim 25, further comprising solid state polymerizing the polyethylene terephthalate polymers.

30. A method according to Claim 25, further comprising forming the polyethylene terephthalate polymers into containers, fibers, or films.

31. A method according to Claim 25, wherein the reactive carrier has a molecular weight of between about 6,000 and 10,000 g/mol.

32. A method according to Claim 25, wherein the reactive carrier has a molecular weight of between about 4,000 and 6,000 g/mol.

33. A method according to Claim 25, wherein the reactive carrier has a molecular weight of between about 2,000 and 4,000 g/mol.

34. A method according to Claim 25, wherein the reactive carrier has a molecular weight of between about 1,000 and 2,000 g/mol.

35. A method according to Claim 25, wherein the reactive carrier has a molecular weight of between about 400 and 1,000 g/mol.

36. A method according to Claim 25, wherein the reactive carrier is a liquid or slurry at near ambient temperatures.

37. A method according to Claim 25, wherein the reactive carrier is introduced to the polyethylene terephthalate polymers in quantities such that its

concentration in the polyethylene terephthalate polymers is less than about 1,000 ppm.

38. A method according to Claim 25, wherein the one or more additives are introduced to the polyethylene terephthalate polymers in quantities such that their concentration in the polyethylene terephthalate polymers is less than about one weight percent.